Management of Esophageal and Pharyngeal Perforation as Complications of Anterior Cervical Spine Surgery

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■ OBJECTIVE: **To describe our experience in treating esophageal and pharyngeal perforation after anterior cervical spine surgery.**

■ METHODS: **Six patients with esophageal injury and one patient with pharyngeal injury after anterior cervical spinal surgery, managed at our department between 2000 and 2015, were analyzed retrospectively.**

■ RESULTS: **During the study period, 7 patients (6 male and 1 female; mean age, 45 years) presented with esophageal perforation. The original anterior cervical spinal surgery was performed due to trauma in 2 patients and because of a degenerative cervical disorder in 5. Early esophageal perforation was diagnosed in 2 patients, and delayed esophageal injury due to chronic irritation with the cervical implants was noted in 5. Three of the five delayed perforation cases were related to cervical instrument displacement. Two patients showed no definite signs of infection, whereas 5 patients had various symptoms, including fever, neck pain, odynophagia, neck swelling, and upper extremity weakness. Two patients with a large defect underwent surgical repair and three with minimal perforation due to chronic irritation from the implants underwent instrument removal without direct repair of defect. Two asymptomatic patients received no intervention. Six patients with infection completely recovered from esophageal injury after treatment for a mean duration of 5.2 weeks (range, 4–8 weeks). One patient died because of postoperative pneumonia and sepsis after implant removal.**

■ CONCLUSIONS: **Esophageal and pharyngeal injury after cervical spinal surgery may occur either directly due to spinal trauma and vigorous intraoperative retraction or due to chronic irritation with cervical implants. In cases of perforation associated with infection, various surgical modalities, including primary closure and reinforcement with a flap, could be considered depending on factors such as esophageal defect size, infection severity, and timing of recognition of injury.**

INTRODUCTION

An anterior approach to the cervical spinal cord and nerve roots is used commonly for various kinds of cervical disorders attributable to spondylotic, neoplastic, infectious, or traumatic causes. With this approach, the posterior neck muscle is not detached from its origin, decreasing neck pain and kyphosis. Furthermore, the use of a transverse incision decreases scarring, which often is imperceptible over the long term.

The potential complications of an anterior approach to the cervical spinal cord and nerve roots, however, include respiratory distress due to retropharyngeal edema or hematoma, vertebral or carotid artery injury, vocal cord paralysis, and Horner syndrome.[1,2] In addition, esophageal or pharyngeal perforation could be a serious complication of anterior cervical surgery. These injuries are especially grave because of the difficulty in controlling infection and uncertain subsequent deformation of cervical alignment. Although a few such cases have been reported, published information to guide spine surgeons in the management of such injuries is limited.

In this study, we analyzed 7 cases of esophageal or pharyngeal perforation associated with anterior cervical surgery performed for a variety of reasons in an attempt to develop guidelines for the evaluation and management of such injuries.

Key words
- Cervical spine
- Complications
- Esophageal perforation
- Revision
- Spine surgery

Abbreviations and Acronyms
MRSA: Methicillin-resistant *Staphylococcus aureus*
SCM: Sternocleidomastoid

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Table 1. General Patient Information

No.	Sex	Age	Injury Site	Timing of Injury	Onset of Symptom	Previous Surgery	Preoperative Diagnosis	Level	Chief Complaint	History
1	M	43	Esophagus	Early	1 day	ACDF	Disc herniation	C6/7	Fever	None
2	M	21	Esophagus	Early	1 month	ACCF	Fracture and dislocation	C6/7	Neck pain	None
3	M	61	Esophagus	Delayed	14 years	ACDF	Fracture and dislocation	C6/7	Incidental finding on EGD	None
4	M	55	Pharynx	Delayed	8 years	ACCF	Disc herniation	C2—5	Odynophagia	None
5	M	52	Esophagus	Delayed	10 years	Arthroplasty	Disc herniation	C5/6	Neck pain	None
6	F	49	Esophagus	Delayed	3 months	ACDF	Disc herniation	C5/6	Odynophagia	None
7	M	79	Esophagus	Delayed	9 months	ACDF	Disc herniation	C4/5	Fever	DM

M, male; ACDF, Anterior cervical discectomy and fusion; EGD, esophagogastroduodenoscopy; F, female; DM, diabetes mellitus.

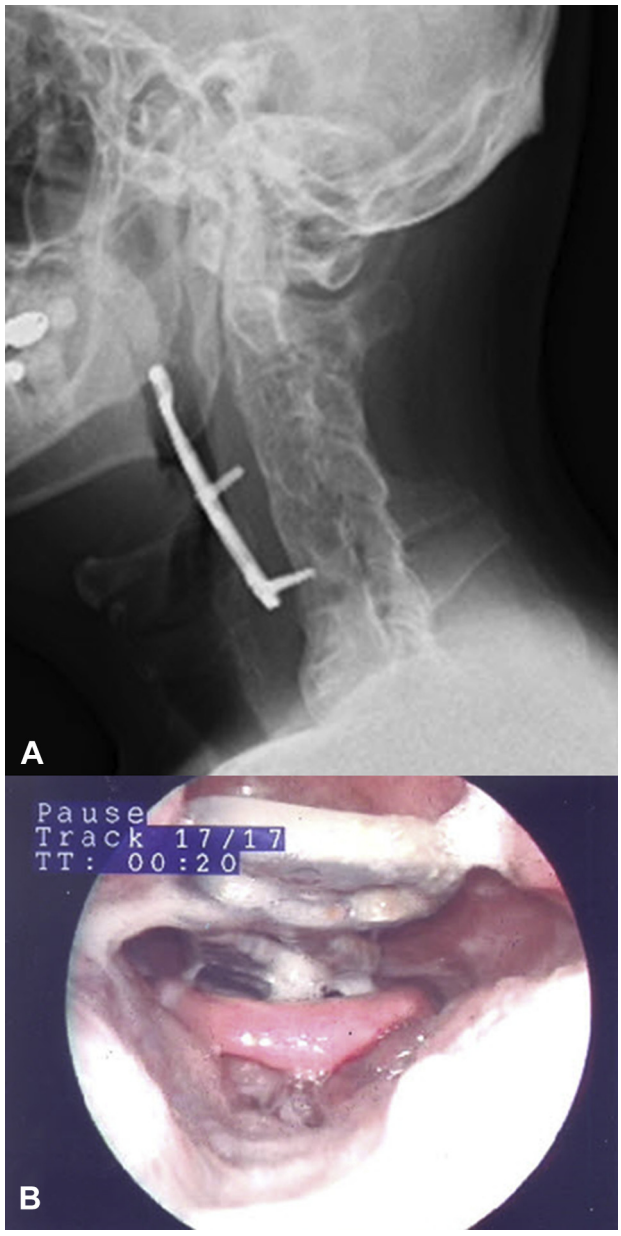

Figure 1. (**A**) Plain radiograph showing instrument displacement. (**B**) Pharyngoscopic image showing plate over epiglottis (case no. 4).

MATERIALS AND METHODS

We retrospectively reviewed the medical records at our institute, a tertiary spinal care center. Between 2000 and 2015, 3362 anterior cervical surgeries were performed by the authors. We assessed each case in regard to the following factors: basic demographics, length of stay, primary pathology, mechanism of injury, time to diagnosis, method of previous surgery, result of inspection tool, method of esophageal repair, removal of